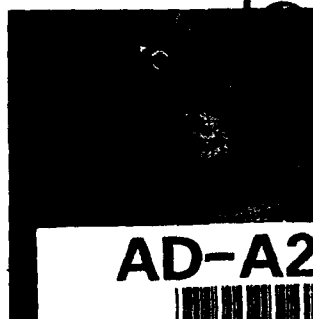
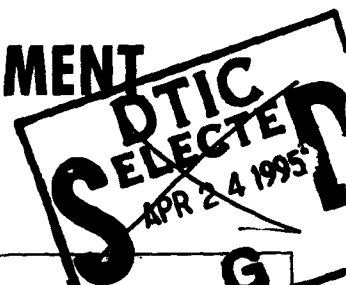


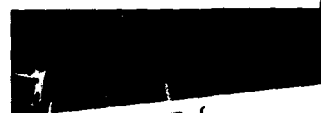
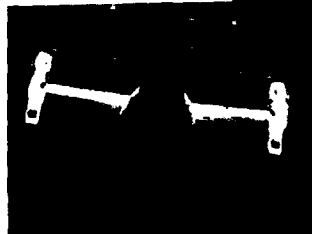
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JOINT PROGRAM MANAGEMENT HANDBOOK



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Lt Col Barry E. Eller

Professor of Systems Acquisition Management

December 1994

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JOINT PROGRAM MANAGEMENT HANDBOOK

PREFACE

This edition of the *Joint Program Management Handbook* updates and replaces the *Joint Logistics Commander's Guide for The Management of Joint Service Programs*, 3rd ed., published by the Defense Systems Management College (DSMC) in 1987. This guide addresses changes in the joint requirements process and the 1991 and 1992 revisions of the "DOD 5000 series" directives and instructions. If you are new to the acquisition process, or unfamiliar with changes to the acquisition process that have taken place since 1991, you should use it in concert with the separately published *Introduction to Defense Acquisition Management*, 2nd ed. by Joseph Schmoll (DSMC Press, 1993).

Like the *Introduction to Defense Acquisition Management*, this handbook provides a quick guide to refresh the skills of experienced acquisition management professionals and serves as an introduction to joint acquisition management for students and newcomers. The views of experienced joint program managers are quoted within this guide to give practical advice to the reader.

Suggested additions, deletions, and other changes are encouraged from readers of this publication. Send them to the Chairman, Acquisition Policy Department, DSMC, Fort Belvoir, Virginia 22060-5426.

ACKNOWLEDGMENT

The author thanks the members of the faculty and staff of DSMC's Acquisition Policy and Program Management Departments for their help in developing this document.

Two individuals deserve special recognition. Joe Schmoll for his concept of a simple user friendly document. Chuck Cochrane for his careful critique and analysis of the draft.

JOINT PROGRAM MANAGEMENT HANDBOOK

TABLE OF CONTENTS

PREFACE	iv
1 AN INTRODUCTION TO JOINT PROGRAM MANAGEMENT	1-1
Purpose	1-1
General	1-1
Authority for Joint System Acquisition	1-4
2 DEPARTMENT OF DEFENSE JOINT ACQUISITION POLICY AND REPORTING REQUIREMENTS	2-1
General	2-1
Memorandums of Agreement and Memorandum of Understanding	2-1
Acquisition Reviews	2-3
Reporting Chains	2-3
Requirements	2-3
Test and Evaluation	2-4
Lead Military Service Responsibilities	2-4
Program Funding	2-4
Quality Assurance	2-5
Reporting Requirements	2-5
Integrated Program Summary (IPS)	2-6
Cost and Operational Effectiveness Analysis (COEA)	2-6
Cost Analysis Requirements Description (CARD)	2-8
System Threat Assessment Report (STAR)	2-8
Test and Evaluation Master Plan (TEMP)	2-8
Computer Resources Life Cycle Management Plan (CRLCMP)	2-8
3 JOINT DEFENSE ACQUISITION MANAGEMENT ORGANIZATIONS	3-1
General	3-1
Background	3-1
Joint Program Oversight Organizations	3-1
Service Relationships	3-4

JOINT PROGRAM MANAGEMENT HANDBOOK

TABLE OF CONTENTS (CONT)

4	JOINT REQUIREMENTS GENERATION PROCESS	4-1
	General	4-1
	Mission Need Statement (MNS)	4-1
	Operational Requirements Document	4-2
5	LIFE CYCLE MANAGEMENT OF JOINT PROGRAMS	5-1
	General	5-1
	Pre-Milestone 0 - Determination of Mission Need	5-1
	Milestone 0 - Concept Studies Approval	5-2
	Phase 0 - Concept Exploration and Definition	5-2
	Milestone I - Concept Demonstration Approval	5-3
	Phase I - Demonstration and Validation	5-3
	Milestone II - Development Approval	5-4
	Phase II - Engineering and Manufacturing Development	5-4
	Milestone III - Production Approval	5-5
	Phase III - Production and Deployment	5-6
	Phase IV - Operations and Support	5-6
	Milestone IV - Major Modification Approval (If Required)	5-7
6	JOINT RESOURCE ALLOCATION	6-1
	General	6-1
	Phase I - Planning, Programming, and Budgeting System (PPBS)	6-1
	Phase II - Enactment	6-2
	Phase III - Apportionment	6-3
	Phase IV - Execution	6-3
7	BUSINESS AND TECHNICAL ASPECTS OF SYSTEMS ACQUISITION IN A JOINT ENVIRONMENT	7-1
	General	7-1
	Program Office Administration and Personnel	7-1
	Acquisition Planning	7-2
	Acquisition Program Baseline	7-2
	Program Protection and System Security	7-3
	Contracting	7-3

JOINT PROGRAM MANAGEMENT HANDBOOK

TABLE OF CONTENTS (CONT)

	Request for Proposal (RFP) Preparation.....	7-4
	Systems Engineering.....	7-4
	Risk Management.....	7-5
	Integrated Logistics Support.....	7-6
	Total Quality Management (TQM).....	7-6
	Configuration Management.....	7-7
	Operational Test and Evaluation	7-7
8	JOINT PROGRAM MANAGEMENT.....	8-1
	General.....	8-1
	Program Office Structure.....	8-1
	Program Office Charter.....	8-1
	Management.....	8-2
	Changes to the Threat.....	8-2
	Operational Requirements/Performance Changes.....	8-2
	Operational Issues and Tactics Changes.....	8-2
	Software Requirements and Testing.....	8-2
	Change and Uncertainty.....	8-4
	Political Dynamics.....	8-4
ANNEX A	MEMORANDUM OF AGREEMENT ON MANAGEMENT OF MULTI-SERVICE PROGRAMS.....	A-1
INDEX	Index-1

JOINT PROGRAM MANAGEMENT HANDBOOK

LIST OF FIGURES

1-1	DEFINITION OF JOINT POTENTIAL DESIGNATOR.....	1-3
2-1	JOINT DOD ACQUISITION AUTHORITY CHAIN (ACAT ID PROGRAMS).....	2-3
2-2	TYPICAL JOINT PROGRAM ANALYSIS AND REPORTING REQUIREMENTS	2-7
3-1	STREAMLINED JOINT PROGRAM REPORTING CHAIN.....	3-2
3-2	DEFENSE ACQUISITION BOARD COMMITTEES.....	3-3
3-3	POINTS OF CONTACT FOR JOINT PROGRAMS.....	3-5
5-1	ACQUISITION PHASES AND MILESTONES.....	5-1
8-1	REQUIRED CHANGES IN PROGRAM DOCUMENTATION.....	8-3

JOINT PROGRAM MANAGEMENT HANDBOOK

1

AN INTRODUCTION TO JOINT PROGRAM MANAGEMENT

Purpose

This handbook is designed to help current and future joint program personnel. It contains advice that complements the more general Introduction to Defense Acquisition Management, 2nd ed., (DSMC Press, March 1993). It incorporates the perspectives of former joint program managers gleaned from a Defense Systems Management College (DSMC)-sponsored interview program. It is not a detailed description of how each military service manages those joint programs for which it is the lead military service. Joint programs are managed on a day-to-day basis in accordance with the lead military services procedures. These details are left to the military service. This handbook provides additional guidance on policies and procedures that help assure a successful joint program.

General

DOD Instruction 5000.2 defines a joint program as:

Any Defense Acquisition system, subsystem, component, or technology program that involves formal management or funding by more than one component during any phase of a system's life cycle shall be classified as a joint program. This includes programs where one DOD component may be acting as acquisition agent for another DOD component by mutual agreement.

As the definition says, joint program management may vary from a Joint Major Defense Acquisition Program to simply one military department serving as a procuring agent for others. Before each milestone decision review, all programs are reviewed for joint potential. If the program is designated as "joint" at any of these points in the life cycle, a joint program manager can be appointed. Whether joint or

JOINT PROGRAM MANAGEMENT HANDBOOK

not, all programs will have a program manager no later than six months after Milestone I, Concept Demonstration Approval.¹

Joint programs can be established by the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) or by agreements between two or more military services or defense agencies. USD(A&T) designates Acquisition Category (ACAT) I programs for joint service management, and other milestone decision authorities may establish lesser category joint programs. Congressional interest in supporting joint requirements and in avoiding duplication among the military services often results in statutory or report language requests for joint programs. Joint programs are established for some of the following reasons:

- Provide a new joint combat capability
- Improve military service interoperability and reduce duplication among the military services
- Reduce development and production costs
- Meet similar multiservice requirements
- Reduce logistics requirements through standardization

Joint program examples include the Worldwide Military Command and Control System (WWMCCS), Joint Stand-Off Weapon (JSOW), V22 Osprey, the Joint Surveillance Target Attack Radar System (JSTARS), and the Joint Tactical Information Distribution System (JTIDS).

The Milestone Decision Authority (MDA) is the individual designated in accordance with criteria initiated by the USD(A&T) to approve entry of an acquisition program into the next phase. An MDA such as USD(A&T), designates joint programs. Joint programs are generally formed by agreements between component MDAs, or by direction of USD(A&T) or Congress. Formal milestone reviews are conducted to encourage joint program consideration. Each military service, the Joint Staff, and the defense agencies coordinate Mission Need Statements (MNSs) to assess the joint potential of their requirements. The sponsoring command assigns a Joint Potential Designator (JPD) in the MNS to indicate potential for joint management, funding, development, or procurement. Figure 1-1 presents these JPDs as defined in the Chairman of the Joint Chiefs Of Staff Memorandum of Policy Number 77 (CJCS MOP 77) and DODI 5000.2. The Joint Requirements Oversight Council (JROC) coordinates the JPD

¹ DODI 5000.2, page 3-10.

JOINT PROGRAM MANAGEMENT HANDBOOK

Joint Potential Designator (JPD)	
Independent	No potential for other service use, systems interface, or joint development or procurement.
Joint Interest	Joint program management is inappropriate, but a potential for other use or systems interface exists. (Formerly interoperating)
Joint	A potential for joint program management, joint funding, or joint development or procurement exists.
Source: DODI 5000.2	
FIGURE 1-1 DEFINITION OF JOINT POTENTIAL DESIGNATOR	

process for ACAT I programs, and the DOD components² perform the same function for ACAT II, III, and IV programs. The MDA approves joint program designation for ACAT I programs as early in the acquisition process as possible and appoints the lead DOD military service. Additionally, each DOD service provides the JROC an annual Joint Potential Assessment Report (JPAR) by the end of each January that describes the program status and JPD of all acquisition programs with joint potential. Formal program reviews determine joint potential before each acquisition milestone.

All programs are torn between the requirements of the Executive Branch, Congress, and industry. Program managers often call this conflict the "tortured triangle." The joint program manager often faces a more complex version of the "tortured triangle," because joint programs generally reflect more complicated joint requirements and are often larger in dollar value to serve the needs of multiple users. On the positive side, however, Congress and OSD usually look upon joint programs with greater favor.

A successful joint program manager must learn enough about the requirements and cultures of each supported military service to place a capable and supportable weapon system in the hands of users. In Joint Pub 1, General Colin Powell, Chairman of the Joint Chiefs of Staff (CJCS), wrote, "Joint warfare is team warfare." By analogy, the successful joint program manager must build a joint team, whose members are skilled in their own types of warfare, and be able to supervise an effective joint organization. Some joint program staffs manage large ACAT I programs. These are programs designated by the Defense Acquisition Executive (DAE) valued at \$300 million in Research, Development, Test, and

²The Office of the Secretary of Defense; The Military Departments; The Chairman, Joint Chiefs of Staff and the Joint Staff; the Unified Commands; the Defense Agencies; and DOD Field Activities.

JOINT PROGRAM MANAGEMENT HANDBOOK

Evaluation (RDT&E) or \$1.8 billion in procurement in FY 1990 constant dollars.³ ACAT I program offices have more senior-level oversight. Other joint program offices generally operate within the lead Service's acquisition chain but face some unique life cycle challenges as will be described later in this guide.

Joint programs are managed through the lead DOD component's acquisition chain. The formal definition of joint programs includes programs with broad joint applications and programs in which one component may act as acquisition agent for another component. Therefore, the joint program manager must assess the needs of the Unified Command⁴ and military service customers and establish a functional management structure to accommodate their concerns. This guide describes regulatory requirements of joint programs and provides management advice designed to support Total Quality Management (TQM)/Total Quality Leadership (TQL) concepts.

Views of Former Joint Program Managers:

- *Jointness may be defined as a single system that satisfies the needs of more than one component.*
- *Never lose sight of who the [joint] customer is and what exactly is required to support the mission objective and requirements.*
- *Each military service has different terminology or "language." The joint program manager is required to comprehend what the military service "actually said" vs. what the military service "actually meant to say."*

Authority for Joint System Acquisition

In general, standard procurement law (e.g., The Competition in Contracting Act) and regulations (e.g., the Federal Acquisition Regulation (FAR), the DOD FAR Supplement (DFARS) and the component supplements) apply to joint programs. The following should be emphasized for joint programs:

- The Law:
 - DOD Reorganization Act of 1986 (Goldwater-Nichols) and another legislative report, *Defense Organization: The Need for Change*, which explains congressional reasoning for increasing jointness and the influence of the combatant commanders.

³ DODI 5000.2, page 2-3.

⁴ Central Command; European Command; Pacific Command; Atlantic Command; Southern Command; Special Operations Command; Strategic Command; Space Command; and Transportation Command.

JOINT PROGRAM MANAGEMENT HANDBOOK

- Section 2308, Title 10, U.S. Code and DODI 5000.2, which describes terms and conditions for military service withdrawal from joint programs.
- Publications:
 - DOD Directive 5000.1, (Defense Acquisition), the broad policy directive.
 - DOD Instruction 5000.2, (Defense Acquisition Management Policies and Procedures), which implements this policy.
 - DOD 5000.2-M, (Defense Acquisition Management Documentation and Reports), the "how-to" manual for required documentation, including formats.
 - CJCS Memorandum of Policy No. 77, Requirements Generation System Policies and Procedures. Provides policy for requirements generation and the processing of MNS and ORDs.
 - JROCM-92-050, JROC, Administrative Instruction, Requirements Generation Process.

2

DEPARTMENT OF DEFENSE JOINT ACQUISITION POLICY AND REPORTING REQUIREMENTS

General

The broad policies of DOD Directive 5000.1 and the procedures in DOD Instruction 5000.2 and DOD 5000.2M apply to joint acquisitions. The DOD framework of integrated management applies to joint programs where fiscal resources, operational testing and evaluation, and logistics involve multiple services and may raise unique integration issues. This chapter highlights some policy areas of joint emphasis and the key documents required of joint programs.

Memorandums of Agreement and Memorandums of Understanding

The terms Memorandum of Agreement (MOA) or Memorandum of Understanding (MOU) are usually interchangeable. They are the basis of a good joint program. They define the ground rules from which most other management actions flow. The rules for MOAs and MOUs for joint programs were defined in an MOA on Management of Multiservice Programs, signed 20 July 1973 (Annex A). It is still the basis for the authority given multiservice program managers.

Early identification of cooperative opportunities ensures all players are brought in prior to the start of development. Having interested parties hammer out the details *before* development starts is critical to success. In particular, the process for negotiating the joint requirements is identified in the MOU. All participants must clearly state joint operational requirements and agree to them. If all participants don't agree to the requirements "up front," the joint program manager will have a hard time trying to satisfy changing demands from two or more chains of command.

Typically these are some issues that should be addressed in MOA and MOUs:

- Management
 - Determine the program manager's scope of authority
 - Establish selection criteria

JOINT PROGRAM MANAGEMENT HANDBOOK

- Define relationships between participants
 - Full partners
 - Associates
- Determine management organization and relationships
- Requirements
 - Establish program requirements
 - Establish process for validating changes
 - Define who can create changes
- Security
 - Determine degree of risk
 - What is to be controlled
 - How it will be controlled
- Funding
 - Determine funding source
 - Share
 - Control
 - Termination
- Contacting
 - Type
 - Whose rules
- Conflict resolution device
- Ongoing working groups to cover these topics:
 - Requirements
 - Logistics
 - Interface (configuration control)
 - Test

Not all joint programs have MOUs or MOAs. On the other hand, some have many. It is possible to run a program without them; they just make it easier. It all depends on the needs of a specific program.

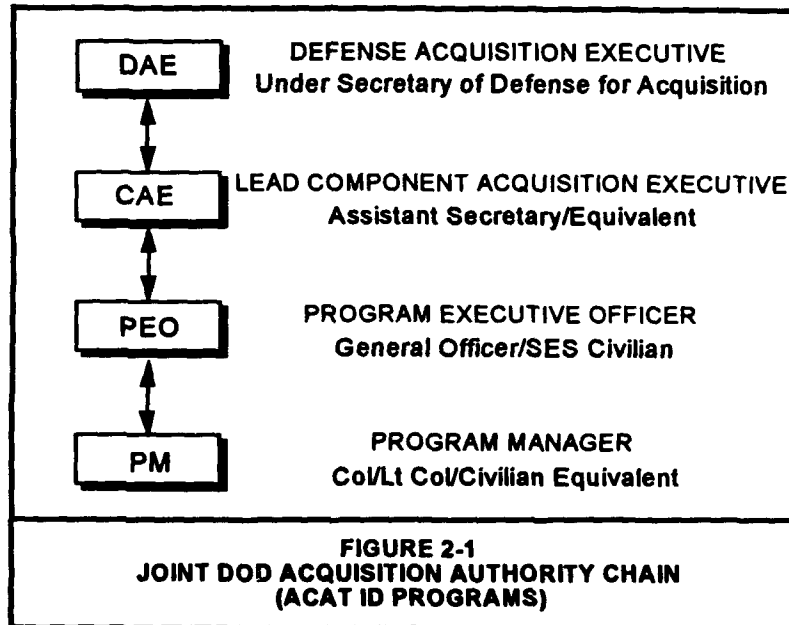
JOINT PROGRAM MANAGEMENT HANDBOOK

Acquisition Reviews

Acquisition Category (ACAT) I programs are reviewed by the Joint Requirements Oversight Council (JROC) prior to Acquisition of Phase 0. At subsequent milestones, the JROC reviews ACAT ID joint programs. DoD and military service formal acquisition reviews include an analysis of potential for joint program designation.

Reporting Chains

Like service-unique programs, joint programs must have short, clear lines of authority. Figure 2-1 shows a typical ACAT ID joint program authority chain, which includes an acquisition authority, program executive officer, and program manager. However, some joint programs may be structured with the joint program manager reporting directly to the Component Acquisition Executive.



Requirements

Major joint program requirements may be initiated by a Unified Command CINC, but the preferred means is staffing through a military service in support of the concerned CINC.

- The joint program manager should learn the combatant commander's rationale for major programs, e.g., obtain wide-area battlefield surveillance or attack time-critical targets in adverse weather and at night.

JOINT PROGRAM MANAGEMENT HANDBOOK

- The joint program manager must be sensitive to military service concerns, e.g., operation in damp, salty environments; maintenance training; weight.

Test and Evaluation

Just as for military service-unique programs, the Office of the Secretary of Defense (OSD) Director of Operational Test and Evaluation (DOT&E) must approve, in writing, the adequacy of all testing and evaluation of all ACAT I joint programs. This approval must be granted prior to full rate production decision (Milestone III) and receive special reporting about operational testing. A lead organization must be designated to coordinate all testing involving more than one Military Department or Defense Agency.

Lead Military Service Responsibilities

The designated lead military service:

- Is responsible for maintaining current program documentation.
- Manages the flow of milestone review and periodic reporting through the lead DOD service acquisition chain.
- Manages the common research, development, test, and evaluation (RDT&E) funds for assigned joint programs (unless directed otherwise).

Program Funding

The lead component funds RDT&E for all program aspects that satisfy common requirements (unless funding exemption has been approved by the milestone decision authority). Procurement is funded by the component in proportion to the number of items being bought by each component. The lead component should have total program funding authority and responsibility as follows:

- Participating components should fund component-unique integration and improvements and resulting procurements.
- Joint program managers should ensure that participants commit funds and that MOAs and MOUs discuss funding.

The National Defense Authorization Act of 1993 changed the guidelines for withdrawing from joint programs as follows:

- For ACAT I programs, the head of the withdrawing DOD component must notify the USD(A&T), the Vice Chairman of the Joint Chiefs of Staff (VCJCS), and the concerned component acquisition authority before withdrawing or "substantially reducing" program participation.
- Substantial reduction in program participation consists of a 50 percent or more decrease in its share of next presidential budget year funding, in total

JOINT PROGRAM MANAGEMENT HANDBOOK

program funding, or in equipment quantities by the components seeking to reduce their participation.

The lead component assesses the impact of the participating component withdrawing or substantially reducing participation. The JROC and Defense Acquisition Board (DAB) or DAB Committees review this analysis and make recommendations. The USD(A&T) makes the final determination of whether the withdrawing component may drop the program or substantially reduce participation and whether the withdrawing military service will be liable for any continuing funding costs. The withdrawing component may not reduce or eliminate funding prior to the USD(A&T)'s final decision.

Similar procedures are used for ACAT II-IV programs, with the lead component making an initial determination of whether the withdrawing component will have continuing financial obligations for the program. For ACAT II-IV programs, withdrawal decisions by the head of the lead component or Component Acquisition Executive may be appealed to the USD(A&T).

Views of Former Joint Program Managers:

- *Joint training saves dollars and adds to trade-offs and assistance for operational users. Joint logistics (one depot) helps monies pass through various checkpoints in the PPBS. Any "jointness" that works needs to be emphasized and reemphasized to Congressional staffers and DOD agencies. Saves the program, sometimes.*

Any defaults or withdrawals from a program may have to be paid for by the military service that bows out. The military service should continue to pay for the program through the next milestone or PPBS cycle.

Quality Assurance

A joint program must have a single quality assurance program, a single change control program, a single integrated test program, and common documentation.

Reporting Requirements

Throughout the acquisition life cycle, the joint program manager must comply with a number of reporting requirements. Figure 2-2 presents a matrix showing most of the reports required of a typical joint program office. This matrix, adapted from one developed by the Unmanned Aerial Vehicles (UAV) Joint Program Office, is based upon the reporting requirements specified in DOD 5000.2, Part 11, Section C, and includes congressional and statutory reporting requirements. Managers of other joint programs may want to use this matrix as a guide for cataloging their own reporting requirements.

Because of the need to coordinate with multiple military services, it often takes twice as long as for a single military service program to generate these reports.

JOINT PROGRAM MANAGEMENT HANDBOOK

Consequently, the joint program manager needs to assess the program office's reporting requirements at an early stage and allow sufficient time not only for developing the reports but also for coordinating them through the military services.

Integrated Program Summary (IPS)

The Integrated Program Summary (IPS) and its functional annexes are used to support top-level acquisition management. It is described in Part 4 of DOD 5000.2 M.

Cost and Operational Effectiveness Analysis (COEA)

COEAs (mandatory for ACAT I and II programs) are prepared by the lead component and considered at milestone reviews beginning at Milestone I. If the COEA is supplemented by other participants, the lead component must ensure that assumptions and methodologies are consistent. Large joint programs will likely have modeling support to perform this analysis. Former joint program managers recommend several different models to improve and verify analysis. The lead component head, or designated representative, often an operating command, is responsible for the COEA.

View of Former Joint Program Manager:

- *Economy of scale is an important issue in the COEA and requirements process.*

JOINT PROGRAM MANAGEMENT HANDBOOK

DOCUMENT	MILESTONE					Required By Congress	STATUTE
	0	I	II	III	IV		
Prepared by PMO Staff:							
Mission Need Statement (MNS)	X						
Operational Requirements Document (ORD)		X	X	X	X		
System Threat Assessment Report (STAR)		X	X	X	X		
Integrated Program Summary (IPS)		X	X	X	X		
Program Structure		X	X	X	X		
Program Life Cycle Cost Estimate Summary		X	X	X	X		
Acquisition Strategy Report		X	X	X	X	Yes	10 U.S.C. §2439
Risk Assessment		X	X	X	X		
Environmental Analysis		X	X	X	X	Yes	10 U.S.C. §4321-4347
Affordability Assessment		X	X	X	X		
Cooperative Opportunities Document		X	X	X	X	Yes	10 U.S.C. §2350a(e)
Program Life Cycle Cost		X	X	X	X		
Acquisition Program Baseline (APB)		X	X	X	X	Yes	10 U.S.C. §2435
Test & Evaluation Master Plan (TEMP)		X	X	X	X	Yes(1)	10 U.S.C. §2389b(1)
Manager Estimate Report (MER)			X	X			
Live Fire Test & Evaluation Waiver			X			Yes	10 U.S.C. §2386(c)
Cost Analysis Requirements Description (CARD)		X	X	X	X		
Independent Cost Estimate (ICE)		X	X	X	X	Yes	10 U.S.C. §2434
Cost & Operational Effectiveness Analysis (COEA)		X	X	X	X		
Early Operational Assessment Report			X/2				
Operational Test & Evaluation Report				X		Yes	10 U.S.C. §133(e)(1)
Development Test & Evaluation Report			X	X			
Low-rate Init Production Rpt for Naval Vessels & Satellites			X				10 U.S.C. §2400
Defense Acquisition Execution Summary (ACAT I Program)					(As Designated)		10 U.S.C. §2436
Prepared by OSD Staff:							
Defense Intelligence Agency (DIA) Report	X	X	X	X	X		
Joint Requirements Oversight Council (JROC) Assess (3)		X	X	X	X		
Integrated Program Assessment		X	X	X	X		
Independent Cost Estimate (ICE) Report		X	X	X	X	Yes	10 U.S.C. §2434
Live Fire Test & Evaluation Report				X		Yes	10 U.S.C. §2386(d)
Beyond Low Rate Initial Production (LRIP) Report				X		Yes	
Acquisition Decision Memorandum (ADM)	X	X	X	X	X		

1. Prior to start of Operational Testing

2. When required to support a Low-Rate Initial Production decision, with exit criteria, at MS II

3. Secretary of Defense "Defense Management Report to the President," July 1989

Adapted from Unmanned Aerial Vehicles Joint Program Office Chart

FIGURE 2-2
TYPICAL JOINT PROGRAM ANALYSIS AND REPORTING REQUIREMENTS

JOINT PROGRAM MANAGEMENT HANDBOOK

Cost Analysis Requirements Description (CARD)

The CARD is prepared by the lead component with inputs from participants. As in single-service programs, the CARD establishes a system description for cost-estimating purposes. For joint programs, the CARD must include common salient system features as agreed to by the participants and service-unique requirements. The CARD is provided in preliminary form to the Cost Analysis Improvement Group.

System Threat Assessment Report (STAR)

The military service intelligence command or agency produces the initial STAR or threat assessment report, described in Part 4, DOD 5000.2, before Milestone I. The STAR contains a system-specific threat, e.g., hostile air defenses; an analysis of technically feasible weapons that could affect the proposed system; and critical intelligence parameters that, if changed, could affect the weapon system. The Director, Defense Intelligence Agency (DIA), advises the DAB and JROC and validates threats developed by the military services for DAB review. The joint program manager should understand the STAR and be able to brief its status, but should leave substantive intelligence issues to professional intelligence officers.

Test and Evaluation Master Plan (TEMP)

TEMPs are described in Part 7, DOD 5000.2M. Joint programs require a single TEMP. The joint program manager must broker a coordinated TEMP with the participants for developmental testing and operational test and evaluation. In the case of ACAT I programs, the Director of Operational Test and Evaluation and the Director, Test and Evaluation (DT) are the approval authorities for TEMP.

Computer Resources Life Cycle Management Plan (CRLCMP)

Automated Data Processing (ADP) utilization is documented in a Computer Resources Life Cycle Management Plan (CRLCMP). The CRLCMP presents the government plan for managing the computer system throughout its life cycle. It addresses software maintenance methods once a system is fielded, which may require the acquisition of computer equipment and preparation of facilities at the intended maintenance sites.

3

JOINT DEFENSE ACQUISITION MANAGEMENT ORGANIZATIONS

General

This chapter discusses the organizations involved in joint program management. It presents some historical background, describes the organizations that provide acquisition oversight, describes military service relationships, and presents issues related to each.

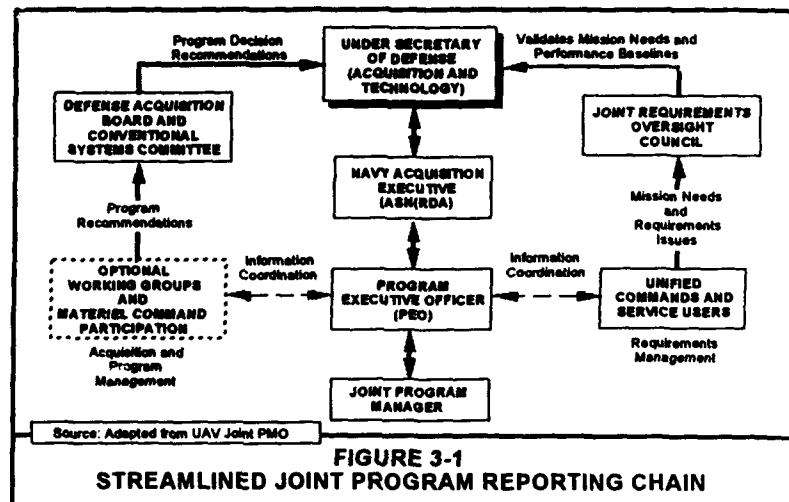
Background

Joint program managers operate in an environment shaped by fairly recent and continuing acquisition reforms. The latest major acquisition reforms started with President Reagan's Blue Ribbon Commission on Defense Management (the Packard Commission, named for its Chairman David Packard, a former Deputy Secretary of Defense). Among other things, the Packard Commission recommended the establishment of an Under Secretary of Defense for Acquisition (USD(A))—now the Under Secretary of Defense for Acquisition and Technology (USD(A&T)). President Bush ordered a follow-on assessment of acquisition, which became known as the Defense Management Review (DMR). The DMR reiterated the findings of the Packard Commission, formed the basis for current DOD 5000 series regulations (DODD 5000.1, DODI 5000.2; DOD 5000.2-M), and recommended a four-tiered, streamlined acquisition structure. The structure runs from the USD(A&T), through the Component Acquisition Executive (CAE), and full-time Program Executive Officers (PEOs) to the individual program managers. Figure 3-1 presents a sample reporting structure.

Joint Program Oversight Organizations

Joint program managers supervising an ACAT I program are concerned with the following personnel and organizations:

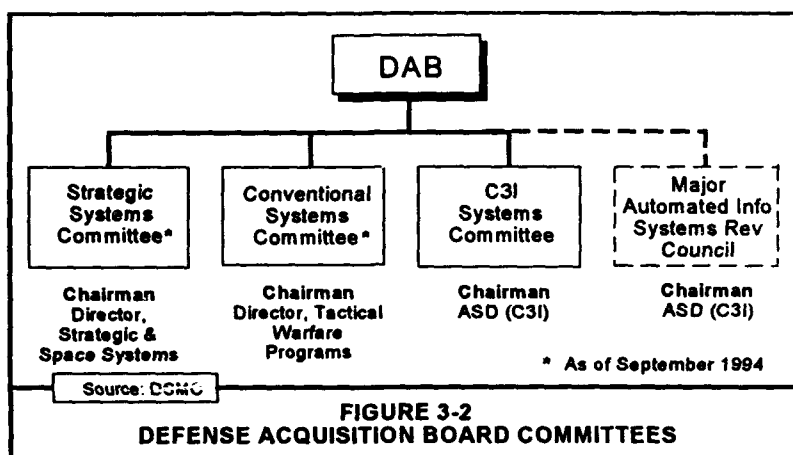
JOINT PROGRAM MANAGEMENT HANDBOOK



- **Under Secretary of Defense for Acquisition and Technology (USD(A&T)):** Serves as the Defense Acquisition Executive, and ranks third in the DOD for acquisition matters, taking precedence over the secretaries of the military services.
- **The Component (military service) Acquisition Executives and their staffs:** The Assistant Secretary of the Army for Research, Development and Acquisition; the Assistant Secretary of the Navy for Research Development and Acquisition (supports the Marine Corps); and the Assistant Secretary of the Air Force for Acquisition.
- **The Joint Requirements Oversight Council (JROC):** The JROC reviews ACAT ID programs at each milestone prior to DAB review and all ACAT I programs at Milestone 0, with emphasis on requirements and performance baseline issues. The JROC is chaired by the Vice Chairman of the Joint Chiefs of Staff (JCS) and includes the Vice Chief of Staff, U.S. Army; Vice Chief of Naval Operations; Assistant Commandant, U.S. Marine Corps; and Vice Chief of Staff, U.S. Air Force.
- **Defense Acquisition Board (DAB):** After military service review and JROC validation, ACAT ID programs are forwarded to a DAB committee, then the DAB, with the milestone decision made by the USD(A&T). The DAB is chaired by the USD(A&T) and includes senior OSD and Component representatives. The VCJCS is the Vice Chair of the DAB. The Chairman of the cognizant DAB committee is also a member of the DAB.
- **Defense Acquisition Board (DAB) Committees:** Figure 3-2 illustrates the DAB committees, which are responsible for making a recommendation to

JOINT PROGRAM MANAGEMENT HANDBOOK

the DAB about an ACAT ID program's readiness to proceed to the next phase of the acquisition life cycle. Typical issues include operational effectiveness; program cost growth and delays; failure to meet technical thresholds; logistics or other supportability problems; threat assessment changes; test and evaluation issues; cooperative development or joint military service concerns; and manpower availability. The USD(A&T) will issue a DAB decision as a go or no-go decision, documented in an Acquisition Decision Memorandum.



- **Cost Analysis Improvement Group (CAIG):** This OSD-level group, chaired by the Director, Program Analysis and Evaluation (Dir, PA&E), is responsible for independent cost review. ACAT ID program office and component life cycle cost estimates must be provided to the CAIG, via the DAB Executive Secretary, no later than 45 days in advance of DAB committee reviews. The DOD component normally briefs the CAIG at least 21 days before DAB committee reviews.
- **Program Executive Officer:** Joint program managers are generally supervised by a Program Executive Officer (PEO) within the lead component. The PEO has responsibilities for oversight of programs of a common nature (e.g., aircraft programs, tactical missile programs) within the lead component, and may exercise oversight of more than one joint program. The PEO can support the joint program manager by interceding to resolve issues within lead and participant budget staffs, procurement commands, and senior Washington area personnel such as those in the intelligence community or Office of the Secretary of Defense. As part of his or her oversight authority, the PEO can recommend removal and replacement of program managers who are not performing satisfactorily.

JOINT PROGRAM MANAGEMENT HANDBOOK

A primary concern of an ACAT ID joint program manager is the time management of his or her interface with oversight organizations. Meeting DAB milestones requires months of preparation and travel. Prior to DAB review, the program manager briefs the using commands; affected military service logistics organizations; key military service acquisition officials, such as the military service PEO and CAE; and other affected organizations. DAB briefing dates are generally not rescheduled unless there is a very high-level requirement or external reason, such as congressional queries about a program.

Views of Former Joint Program Managers:

- *The joint program manager must learn perseverance.*
- *When communicating with DOD agencies (OSD), the program manager must rely on continuous dialogue to keep them up to speed on program status and associated problem areas. In the long run, OSD may prove to be of assistance in keeping the program funded or to help resolve problem areas.*

Service Relationships

Joint program managers must coordinate fiscal, logistics, and other matters across one or more military service staffs and with joint users. To coordinate effectively, the joint program manager must understand the nature of the joint requirement. Furthermore, the joint program manager faces a variety of users requiring special attention. For example, an Army user may be more concerned about target vehicle identification and issues within a sensor system (e.g., armored personnel carrier, tank, or type of tank) than an Air Force surveillance system program manager who focuses on airframe and sensor requirements. The Navy and Marines often have special environmental protection requirements for equipment used or stored aboard ships. Even equipment rack size can be a factor for supportability. Service-specific use of technical jargon, informal military service networks, and unique requirements, such as in the special operations area, require a special effort by joint program managers. Figure 3-3 presents points of contact for joint programs.

JOINT PROGRAM MANAGEMENT HANDBOOK

DoD Component	General POC	Specific POC
Office of the Under Secretary of Defense for Acquisition	Director Acquisition Program Integration (Dir, API)	Deputy Director, Acquisition Program Integration for Acquisition Systems Management (DepDir, ASM)
Department of the Army	Assistant Secretary of the Army for Research, Development, and Acquisition (ASA(RDA))	Chief of Requirements, Programs, and Priorities Division, Force Structure Integration Directorate, Office of the Deputy Chief of Staff for Operations and Plans (DAMO-FDR)
Department of the Navy	Assistant Secretary of the Navy for Research, Development and Acquisition (ASN(RDA))	Deputy for Acquisition Policy, Integration, and Accountability (Dep, APIA)
Department of the Air Force	Deputy Chief of Staff for Plans and Operations (AF/XO)	Director of Operational Requirements (AF/XOR)
CJCS (Joint Staff)	Vice Chairman, Joint Chiefs of Staff (VCJCS)	Chief Systems Program Evaluation Division (J8/SPED)
Other DoD Components	US Special Operations Command (USSOCOM)	Director of Acquisition, Special Operations Research, Development, and Acquisition Center (Dir, Acq/SORDAC)
Source: Adapted from DODI 5000.2, Part 12B		
FIGURE 3-3 POINTS OF CONTACT FOR JOINT PROGRAMS		

Views of Former Joint Program Managers:

- *Develop quarterly briefings for participants' staffs to keep them informed on program status and to eliminate surprises.*
- *Ensure that the lead component develops the basic "system." Any modifications added should be tested by the military service for program compliance before implementing them into the mainstream.*

4

JOINT REQUIREMENTS GENERATION PROCESS

General

An understanding of requirements is especially key in joint programs for the reasons discussed in Chapter 3. Moreover, because of the pace of change in our national security environment and the resulting restructuring of the Unified Commands and military services that reflect this global environment, requirements are frequently altered today. The Secretary of Defense has assigned new missions to the U.S. Atlantic Command, including overseeing joint exercises of CONUS-based forces and peacekeeping support, and the U.S. Strategic Command was recently formed. The Army is preparing for expeditionary operations under its *Land Force Dominance* doctrine. The Navy and Marine Corps are planning for more emphasis on littoral warfare as described in their *From The Sea* white paper. For its part, the Air Force has undertaken the most major reorganization since its founding to implement its *Global Reach-Global Power* strategy. Requirements generation is an evolutionary process, defining a needed capability to fulfill a deficiency or exploit a gap amid this changing military environment.

Mission Need Statement (MNS)

The MNS identifies the need or deficiency in broad operational terms. It is written after analysis shows that nonmateriel solutions and existing systems will not address the deficiency. Validation is the review by an operational authority¹ to confirm the requirements, assess joint service potential, and make a Milestone 0 recommendation. The approval authority sends the requirement for action to USD(A&T) for ACAT I programs and to the DOD Component Acquisition Executive for other categories. The approval authority should also recommend the Joint Potential Designator (JPD) and may recommend the lead component for joint programs. The Unified Command CINCs and military service Chiefs may validate and approve ACAT II-IV MNS. With the exception of USSOCOM, the Unified Command CINCs have no CAE. The Unified Commands generally work with their

¹ The JROC does this for ACAT I. Military service chief for ACAT II, III & IV.

JOINT PROGRAM MANAGEMENT HANDBOOK

components to find a sponsor, but may send a MNS directly to the JROC for resolution and recommendation of a lead component.

Operational Requirements Document (ORD)

The ORD focuses on incorporating the results of cost-schedule-performance tradeoffs from concept definition and cost studies. The ORD documents system requirements for fielded systems, including system capabilities and characteristics. It specifies system requirements with regard to performance objectives and thresholds and identifies key parameters. An *objective* is the most operationally cost-effective level of performance. A *threshold* is the minimum acceptable level of performance needed to meet the user's need. Below this, the system's value becomes questionable. *Key parameters* are those capabilities and characteristics so significant that failure to meet them may cause the program to be reassessed or terminated.

The ORD provides a link from the MNS to the acquisition program baseline and to the contract specifications. Contract specifications for the Demonstration and Validation Phase must be consistent with (but not necessarily match) ORD threshold values. Contract specifications reflect objective values in the Engineering and Manufacturing Development Phase. At Milestone II (for Major Defense Acquisition Programs), the JROC reviews critical system characteristics such as survivability, size and weight, and interoperability, some of which may be critical system characteristics, for Major Defense Acquisition Programs.

Views of Former Joint Program Managers:

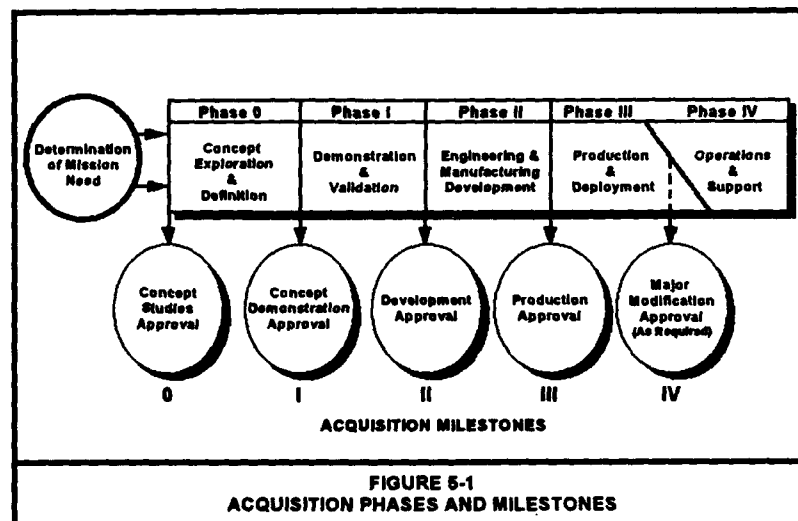
- *A major cost driver is the inability to make decisions on joint requirements.*
- *Contract problems can be traced back to technical issues and related to the ability to meet the requirements levied upon the system. Problems arise from a lack of distinction between program "objectives" and "thresholds" wherein the military services set their thresholds equal to their objectives for fear that their objectives would otherwise not be met. The joint program manager must validate the requirements on merit, with a value-added perspective.*
- *The JROC process is important because of user participation and the ability to coordinate/identify requirements issues.*
- *In development of the ORD, 50 percent of the time is spent with users discussing trade-offs.*

5

LIFE CYCLE MANAGEMENT OF JOINT PROGRAMS

General

The acquisition life cycle, as depicted in Figure 5-1, consists of a series of decision points and phases of activity. This chapter reviews those decision points and phases and provides general observations and recommendations regarding the joint program manager's activities in each phase.



Pre-Milestone 0 - Determination of Mission Need

It is at this point in the acquisition cycle that the Joint Requirements Oversight Council (JROC) reviews Mission Need Statements (MNS) for potential ACAT I programs to determine if the expressed need is common to more than one military service and may ultimately result in the initiation of a joint program. As discussed earlier in this guide, joint programs do not formally exist at this point in the

JOINT PROGRAM MANAGEMENT HANDBOOK

acquisition cycle. Nevertheless, if a joint requirement is deemed to exist, the JROC recommends designation of a lead component for conducting the Concept Exploration and Development Phase of the program to the USD(A&T).

Milestone 0 - Concept Studies Approval

The JROC examines the needs expressed by the military services to confirm that they cannot be met by nonmateriel solutions (e.g., a change in tactics). For ACAT I programs, if the JROC determines that a common need expressed by two or more components can only be met by a materiel solution, the DAB assesses the JROC's findings and recommends to the USD(A&T) whether studies should be conducted. The USD(A&T) formally initiates the Concept Studies Phase via an Acquisition Decision Memorandum that names the lead components to conduct the studies; identifies minimum alternatives to be explored; and establishes the criteria for exiting the Concept Exploration and Definition Phase.

For ACAT II through IV programs, the military services, through the DOD Component Acquisition Executive, determine whether to initiate the Concept Studies Phase.

Phase 0 - Concept Exploration and Definition

During Phase 0, the lead component initiates a wide variety of short-term studies to assess alternatives to satisfying the need. These studies address trade-offs among cost, performance, and schedule. Although at this point a joint program still does not formally exist, the activities of the staff conducting the studies begin to take on some of the flavor of a joint program.

This is a critical stage in the development of a joint program. The joint program manager must conduct coordination among the participating military services to identify their specific needs. The lead component staff conducting the studies needs to be cognizant of the different military services' approaches to system employment and logistics support, to include possible military service-unique needs. Because of the impact on the unit and life cycle costs of the alternatives, the quantities and the logistics support infrastructures needed by each military service are also addressed at this point. Furthermore, whoever is leading the program, prior to the designation of the joint program manager, needs to conduct inter-service coordination to develop the acquisition strategy. The weapon system proposed acquisition strategy must comply with all relevant arms control treaties, according to DOD 5000.2.

In sum, it is during this stage that the system requirements begin to take shape. As verified through the DSMC-sponsored interviews with joint program personnel, establishing the joint requirements that the proposed system must meet is the most critical factor in determining the eventual success of the program. In particular, the participants must ensure agreement on system requirements and identify specific service-unique requirements that need to be paid for separately by that military service.

JOINT PROGRAM MANAGEMENT HANDBOOK

Milestone I - Concept Demonstration Approval

This milestone marks the official birth of a joint program. The decision to initiate a joint program to develop a new system is made only after it has been determined that the need cannot be met by using or modifying an existing military system, using or modifying an existing commercial or allied system, or pursuing a cooperative research and development program with one or more allied nations.

The decision to initiate a joint program is promulgated via an Acquisition Decision Memorandum approving the initiation of the new joint program under the leadership of a particular military service and giving permission to enter the next acquisition phase.

Phase I - Demonstration and Validation

During Phase I, joint program office activities go into full swing. The program office is established (if not already formed) and jointly manned. Funding from multiple military services is brought together under the control of the lead component. Funding for common RDT&E is provided by the lead component, while funding for military service-unique requirements is provided by the military service needing the unique capability.

As the phase continues, contracts are let to develop and demonstrate hardware and software systems, and testing is conducted to determine if the systems being developed meet the established requirements.

In addition, the logistics support infrastructure required to support the system is examined in detail. There are basic underlying differences in logistics infrastructures among the participating military services. These differences primarily affect maintenance concepts and maintenance support equipment. The joint program manager must ensure that sufficiently detailed planning occurs to account for these differences and that commonality is maintained to the greatest extent possible.

Because this is the fledgling stage of the system acquisition cycle, it is the phase during which the program is most vulnerable to external criticism, political pressures, and change. During this phase, the joint program manager must work very closely with the participating military services to maintain "jointness" and to balance attention between the internal day-to-day activities of the program and external factors that may work to derail the program. Briefings to external organizations become routine, and virtually every program management decision needs to be coordinated through multiple channels. Historically, it has been commonplace for participating military services to second-guess the joint program manager and develop their own independent technical and cost estimates regarding the program. Such independent assessments, particularly if they lead to radically different conclusions, can result in the premature termination of a program. Consequently, it is absolutely essential for the joint program manager to be able to

JOINT PROGRAM MANAGEMENT HANDBOOK

reconcile differences among the participating military services so that common and consistent data are presented to outside organizations. This will prevent confusion and help maintain an accurate understanding of the program by outside organizations.

At the end of the phase, the joint program manager must be able to demonstrate success in meeting the objectives of the Demonstration and Validation Phase and present results upon which to make a sound decision to proceed into the Engineering and Manufacturing Development Phase.

Milestone II - Development Approval

Development approval marks a significant step for any program, but it is even more significant for a joint program because of the obstacles that generally must be overcome to get this far. Because of differences among the military services, some joint programs never pass this step and are pursued no further. Others are completely restructured at this point before they are permitted to continue.

Although joint programs normally are initiated at Milestone I, this step may also mark the beginning of a joint program. Because the opportunity for satisfying joint requirements is reviewed throughout the acquisition cycle, some individual military service programs have been merged at this point into a new single joint program. A recent example is the creation of the Joint Stand-Off Weapon (JSOW) Program, under the leadership of the Navy, resulting from the merger of the Navy's Advanced Interdiction Weapon System (AIWS) Program and some Air Force weapons programs that were still in the Concept Exploration and Definition Phase.

In either case, Development Approval constitutes perhaps the most significant acquisition milestone because of the commitment that has to be made by the military services to the continuation of the program after this point. According to DOD 5000.2, withdrawal from a joint program by any participating military service may require the withdrawing military service to provide continuing financial support to the program. Although this requirement is imposed from the onset of the joint program, given the much greater financial commitments associated with Engineering and Manufacturing Development, the decision to proceed into the next phase makes it extremely costly for a military service to withdraw from participation after this point.

Phase II - Engineering and Manufacturing Development

The Engineering and Manufacturing Development Phase presents a continuing set of challenges to joint program management. As this phase progresses, many activities within each of the participating military services need to be brought together to ensure that the program proceeds on schedule. Among the activities that present the greatest challenge to the joint program manager are joint military service testing and planning for deployment and subsequent logistics support.

JOINT PROGRAM MANAGEMENT HANDBOOK

System testing often becomes a problem area, particularly with regard to how well the system satisfies previously agreed upon "joint" requirements. There is often pressure to develop military service-unique modifications and variants to the basic system to meet unique requirements. Another issue that arises is the desire by each military service to participate directly in the testing of the system, not only in terms of Operational Test and Evaluation (OT&E) but also in Developmental Test and Evaluation (DT&E). This competition has often led to duplicate testing and the manufacture of extra test assets to satisfy these desires. A unified test plan under the management of the lead component must be coordinated with the participating military services to ensure that system tests address the test concerns of the participating military services.

As the Engineering and Manufacturing Development Phase progresses, more detailed planning must be conducted regarding how the system will be deployed and logistically supported. The magnitude of planning activities that must occur may lead to the development of large, often separate staffs within the program office to conduct the logistics planning for each military service and perform the necessary inter-service coordination to ensure smooth deployment.

The joint program manager must work with each of the military services to ensure continued funding of the program. In particular, final agreement must be reached regarding proposed production quantities and rates because of their effect on unit costs and logistics support.

During this phase, the joint program office must plan for the support of the system once it is deployed. One such type of support entails collecting and analyzing feedback from the user military services on the reliability of the systems used in the OT&E. This means that procedures and systems need to be developed to physically collect and process data that may be collected in different reporting formats and processed using different computer systems. It also means that the joint program staff that will analyze the data needs to be cognizant of the differences in reporting criteria, formats, and levels of detail used by the different military services in collecting the data. The systems for OT&E may be acquired through low rate initial production (LRIP). The number of systems needed will have to be coordinated with the participating military services well in advance. The numbers will be based on the military services' early operational assessment of prototypes during Phase I. It is important to note the reasons that may be used to justify an LRIP: first, as stated above, to provide production representative articles for OT&E; second, to work the problems out of the manufacturing process; and last, to ramp up to full rate production smoothly. A program may not justify LRIP for meeting initial operational capability (IOC).

Milestone III - Production Approval

The decision to proceed from Engineering and Manufacturing Development into Production signifies that the joint program has successfully navigated innumerable

JOINT PROGRAM MANAGEMENT HANDBOOK

obstacles over the years and is ready to begin delivering its product to the military services for use. To fund the production of the system, each participating military service must program procurement dollars for its share of the production.

Phase III - Production and Deployment

During the Production and Deployment phase, the principal responsibility of the joint program manager is to ensure that the system is being built as planned, on cost, and delivered satisfactorily to the user. This phase calls for even more coordination with the user military services, particularly with regard to delivery of systems and their accompanying maintenance support subsystems including extensive amounts of technical orders and other documentation. To facilitate this process, the Joint Program Office may need to have personnel collocated with the logistics organizations of the user military services.

Recognizing that virtually every major weapon system has considerable overlap between the Production and Deployment and the subsequent Operations and Support Phases, the joint program manager must ensure that procedures and systems are in place during the Production and Deployment Phase to support the system after it is fielded.

Feedback from users invariably results in a need to modify the system even as it is being produced and deployed. This necessity means that the joint program manager must continue to coordinate with the military services on requirements and identify common and military service-unique modification requirements. Furthermore, it means that, although the program is in the Production Phase, RDT&E funding must continue to be provided to pay for continued development and testing of these modifications. Agreement on the required modifications and funding for them can normally be handled within the purview of the joint program office in coordination with the military services affected.

Phase IV - Operations and Support

Phase IV begins as soon as the first systems are delivered to the user and often overlaps Phase III. No milestone is associated with the beginning of this phase. The primary responsibility of the joint program manager during the Operations and Support Phase is to ensure that users' needs continue to be met, primarily through tracking system reliability and processing problem reports. It also entails managing continued production of spares and repair parts and maintenance support systems, identifying the need for system modifications and improvements, and managing them once they are approved.

As mentioned above, there is usually considerable overlap between the Production and Deployment and the Operations and Support Phases. Furthermore, it is common for a joint program manager to have to manage multiple variants of a system, each of which may be in a different phase of the acquisition cycle. A classic example of such a program is the AIM-9 Sidewinder air-to-air missile program,

JOINT PROGRAM MANAGEMENT HANDBOOK

which as of 1991 includes the AIM-9L in the Operations and Support Phase, the AIM-9M in both the Production and Deployment and Operations and Support Phases, the AIM-9R in the Engineering and Manufacturing Development Phase, and the AIM-9X in the Concept Exploration and Development Phase.

Milestone IV - Major Modification Approval (If Required)

Sometimes a major modification to the system must be made, because of evolving changes in the threat, to overcome deficiencies discovered through operational testing or use, or to reduce operations and support costs. Changes that need to be made to systems still in production are considered "modifications" according to DODI 5000.2. As described therein, whenever the magnitude of such a modification is such that it meets ACAT I or II criteria or is designated as Major Defense Acquisition Program by the USD(A&T), the proposed modification needs to be submitted for Milestone IV approval. In contrast, changes to systems that are no longer in production are considered "upgrades," and must be submitted for Milestone 0 approval where the proposed changes compete against other conceptual alternatives to the change. For modification or changes that do not meet ACAT I or II criteria, procedures must be coordinated with the participating military services. When either situation occurs for a joint program, the joint program manager must ensure that all of the required data are gathered and the necessary analyses are conducted to support the decision process.

6

JOINT RESOURCE ALLOCATION

General

As discussed below, the joint program manager is involved in the four phases of the Resource Allocation Process (RAP):

- Planning, Programming, and Budgeting (Phase I)
- Enactment (Phase II)
- Apportionment (Phase III)
- Execution (Phase IV)

These phases are calendar-driven and are independent from the event-driven acquisition process. The joint program manager must take care to not confuse the phases of the RAP with those of system development.

Phase I - Planning, Programming, and Budgeting System (PPBS)

Resources for joint programs are provided through the DOD Planning, Programming, and Budgeting System (PPBS). From the standpoint of the joint program manager, the military service Program Objective Memorandums (POMs) and budgets are usually the source of programmatic funding. OSD and the Commanders in Chief (CINCs) of the Unified Commands can provide support for joint issues, including specific programs, during the PPBS cycle.

The Deputy Secretary of Defense (DEPSECDEF) manages the PPBS with the advice and assistance of the Defense Resource Board (DRB), which he chairs. The advocacy for joint programs in the PPBS process often comes from Congress, OSD, the Joint Staff and the Unified Commands. The joint program manager should be aware of the military strategy for employing his or her program in order to understand the related planning and programming processes that occur in the military services, Joint Staff, and OSD. For example, U.S. Southern Command (USSOUTHCOM) counters Latin American security issues with a peacetime engagement strategy that uses command, control, communications, and intelligence (C3I) systems to help host governments cope with insurgents, narcotics traffickers, and other threats. In biennial PPBS years and in other designated years, the Unified

JOINT PROGRAM MANAGEMENT HANDBOOK

Command CINCs can advocate system and other needs through Integrated Priority List (IPL) submissions from the CINCs to the DRB through the JCS.

View of Former Joint Program Manager:

- *Must understand the PPBS process and associated "drills." Program manager must learn not to panic and have most documentation available to give honest, if tentative answers.*

Phase II - Enactment

Congressional review of the DOD portion of the President's budget is undertaken by authorizing committees and appropriating committees before budget bills are introduced into law. Congressional authorization specifies the substance of a program, including authorizations for major weapons programs. The Senate and House Armed Services Committees are the major DOD authorizing committees. A review of their subcommittees suggests some areas of interest. The Senate Armed Services Committee has subcommittees on Readiness, Sustainability, and Support (including military construction); Strategic Forces and Nuclear Deterrence; Conventional Forces and Alliance Defense; Defense Industry and Technology; Manpower and Personnel; and Projection of Forces and Regional Defense. The House Armed Services Committee has subcommittees on Research and Development; Seapower and Strategic and Critical Materials; Procurement and Military Nuclear Systems; Investigations (including jurisdiction over acquisition regulations and related procurement matters); Readiness; Military Installations; and Military Personnel and Compensation. The House Armed Services Committees has established panels including Special Operations and Acquisition Policy. The joint program manager may have dealings with the staffs of these committees and, more formally, through OSD or military service congressional liaisons. It is important that the program description provided to Congress be consistent with authorization bill language. Moreover, the joint program manager should be aware of report language affecting his or her project, since failure to note the language may result in funding or statutory penalties.

The House and Senate Appropriations Committees and their Defense Subcommittees on Defense and Military Construction start formal reviews of the proposed presidential budget in February. Appropriations committees apply funding across all federal programs, e.g., education, defense, entitlements. Accordingly, competing demands such as infrastructure needs often result in defense decrements. The appropriations committees reconcile authorizations with budget funds. The House and Senate vote on both authorization and appropriation bills after conference committee meetings. The OSD Comptroller issues guidance when the authorization and appropriation bills are inconsistent (as they can be). If enactment of the appropriations bill is delayed beyond the start of the fiscal year, a "continuing resolution" is passed to authorize obligations that do not exceed the lesser rate of prior year obligations or what is reflected in prior action of Congress. OSD and the

JOINT PROGRAM MANAGEMENT HANDBOOK

military services also provide guidance during "continuing resolutions." These continuing resolutions usually allow federal agencies to operate for a fixed period at a reduced spending rate while Congress finishes work on each agency's actual budget for the coming year.

Views of Former Joint Program Managers:

- *The biggest problem associated with congressional and military service staffs is perceptions.*
- *Briefings on the "Hill" to congressional staffers are important to aid communication and exchange of important program status data.*

Phase III - Apportionment

The Office of Management and Budget (OMB) allocates funding to OSD. In turn, these funds are reallocated to the military services and other DOD organizations. Apportionment allows the President, through OMB, DOD, and the military services, to control funding execution rates. Joint program managers are affected by the monitoring that accompanies this process. The military services monitor the rates at which funds are committed (assigned to a project); obligated (placed on contract); and expended or disbursed (paid to a vendor). OSD uses the information collected and analyzed by the military services to exercise its financial control. OSD's control includes taking money back when expenditure or obligation rates are too low or assigning to the military services, and other organizations, recoupment objectives, and plans for saving current or prior year funding. The joint program manager needs to be cognizant of the cycles within each of the military services from which he or she obtains funding. As an example, one major joint program lost several million dollars because the other participating military service's deadline for pulling unobligated money back occurred much earlier than the lead component's deadline.

Views of Former Joint Program Managers:

- *The program manager must understand the PPBS process and have a working knowledge of each military service's budget process. Each military service must have money to support the program; this precludes any problems encountered in the system development phase.*
- *Budget shortfalls need to be addressed for each military service's budget submission window and discussed with the program management team or working group.*

Phase IV - Execution

The execution phase occurs when appropriated funds are spent on defense programs. The obligation and expenditure terms discussed above apply to the execution phase, since the program expenditures provide the raw data that DOD uses for

JOINT PROGRAM MANAGEMENT HANDBOOK

apportionment management. The DOD fiscal structure is a biennial process tied to Congress. The DAB process discussed in Chapter 2 is a DOD management control system that can be overruled by the budget. The DAB can clear a program to advance to the next milestone, but DAB guidance is legally and practically contingent on funding.

The inherent tension in the process for joint program managers is that the PPBS is a calendar-based process, while joint program funding needs are related to acquisition milestones, engineering, and production schedules. A sensitivity to the military service personnel who monitor the budget aspects of joint programs is crucial to finding ways to adjust the DOD resource management system to individual programs. For example, the military services have been delegated \$10 million for O&M and procurement and \$4 million for RDT&E reprogramming authority from OSD and by Congress through past practice. This delegation is called below-threshold reprogramming and applies across the life of the appropriation. For example, RDT&E is a two-year appropriation, and the \$4 million threshold applies across the two years. Larger funding amounts can be reprogrammed (redirected) to higher priority projects under DOD or congressional authority. The PPBS and execution are also related in that the program manager must work with budget staffs to provide necessary funding continuity for projects. Contract and budget staffs can help the joint program manager plan for needed fiscal continuity. Execution is closely related to the PPBS calendar cycle, but driven by technical events.

Using other defense components to contract and manage key program activities can adversely affect program execution if they fail to spend the program funds as planned. Consequently, the joint program manager must work closely with program control personnel to monitor execution of funds.

Views of Former Joint Program Managers:

- *Understanding the "color" of money is a necessity. The program manager needs to understand where, when, and how the money comes. He or she needs to know the (color) differences of RDT&E, Procurement, and O&M dollars.*
- *Gaps may exist from program start to entry into production; therefore a program manager must have periodic reviews of the program to ensure focus, intent, and purpose remain at the forefront.*

7

BUSINESS AND TECHNICAL ASPECTS OF SYSTEMS ACQUISITION IN A JOINT ENVIRONMENT

General

This chapter discusses business and technical aspects of joint program management. It complements Chapter 5 (life cycle management) and Chapter 6 (PPBS issues) by highlighting selected acquisition areas:

- Program Office Administration and Personnel
- Acquisition Planning
- Acquisition Program Baseline
- Program Protection and System Security
- Contracting
- Request for Proposal (RFP) Preparation
- Systems Engineering
- Risk Management
- Integrated Logistics Support
- Total Quality Management
- Configuration Management
- Operational Test and Evaluation

Program Office Administration and Personnel

Administrative and personnel planning are important for joint programs. Joint Program Offices follow the lead DOD component's acquisition regulations and should use the lead DOD component's administrative procedures. The joint program manager must recognize that some key administrative matters, e.g., funding and personnel evaluations, must be prepared in accordance with sister

JOINT PROGRAM MANAGEMENT HANDBOOK

military service standards. The deputy joint program manager is normally selected from the most important participating military service. The deputy is crucial to building and sustaining relationships with the sister military service and in serving as an alter ego of the joint program manager, especially when the program manager is traveling. It should be noted that when more than one participating military service is involved, the program office may have a deputy program manager from each. The selection of other key personnel such as the logistics manager and key system deputy manager (e.g., Deputy Program Manager for Avionics) requires a sensitivity toward other military services' career paths and rating procedures. It is important to review the personnel briefs of key personnel who are nominated for program roles.

Matrix management is often an effective way to manage joint programs. The lead component usually provides the greatest amount of engineering staff, with participating military services performing discrete tasks or providing integrated personnel. Given normal fluctuations in design and engineering schedules, matrix management is often used to align engineering personnel with tasks.

View of Former Joint Program Manager:

- *Always split work with the deputy program manager. The requirement may be based on expertise, but cross-talk is important for program performance.*

Acquisition Planning

Joint programs require special attention to multiservice funding requirements and to acquiring the right mix of joint expertise for the source selection process. The acquisition plan must specify appropriate joint funding commitments, including the type of moneys required. Joint users and military service logisticians for systems should be represented on the Source Selection Advisory Council, the Source Selection Evaluation Board, and in Statements of Work (SOW) reviews and Contract Data Requirements List (CDRL) calls.

View of Former Joint Program Manager:

- *Relationships are important to cultivate and manage through the program's life cycle.*

View of Senior JROC Member:

- *"Key performance parameters should be output-oriented, measurable, achievable, and testable." Attributed to the Vice Chief of Staff USAF.*

Acquisition Program Baseline

The Acquisition Program Baseline (APB) is developed by the program manager for the Milestone I decision. A Development Baseline is prepared at Milestone II and a Production Baseline is prepared at Milestone III. Part 14 of DODI 5000.2 describes baseline formats. The joint program manager submits the baseline through the

JOINT PROGRAM MANAGEMENT HANDBOOK

decision chain to the Milestone Decision Authority. For ACAT IC programs, the Component Acquisition Executive will approve the baseline and forward an information copy to the USD(A&T). For ACAT ID programs, the lead DOD service will submit the APB to USD(A&T) for approval.

The acquisition program baseline contains key cost, schedule, and performance parameters for the program. ACAT I programs have the most formal deviation reporting requirements, but all programs will require program baseline deviation reporting. Joint program baseline issues have involved a lack of understanding of key performance parameters and their significance. Joint program managers need to keep consistent parameters in key documentation: operational requirements document, the TEMP, the acquisition program baseline, and in JROC presentations for ACAT I programs.

Program Protection and System Security

Joint programs must have an effective security plan. The plan should protect key sensitive aspects of the program from espionage threats and include government and industry program participants. The plan should discuss operational security (OPSEC) issues, especially if the program is sensitive. Security is important to program execution because delays in security clearances and plant accreditations can adversely affect scheduling, especially in special access programs. Information security is becoming more of an issue. Communications and computer systems must be accredited for various levels of classification, including special access levels. Delays in accreditation can adversely affect the program if the joint program manager does not plan for system certifications. Additionally, communications security (COMSEC) equipment is increasingly embedded in equipment at the design stage, requiring early planning for COMSEC.

Views of Former Joint Program Managers:

- *Must have program protection plan for sensitive programs.*
- *Security issues and special access requirements need to be addressed in MOUs and MOAs. Identify constraints and responsibilities of military services and contractors. Sometimes lead component regulations are followed; if this is the case, need to ensure all military services associated with the program understand primary guidance*
- *Special Access Security is a major issue that needs to be addressed.*

Contracting

Contracting is controlled by law and acquisition regulations. Accordingly, the bulk of contracting is standard across the military services in its broad framework, but there are differences in military service proposal evaluation procedures and other operating procedures. Since joint programs may have more requirements changes

JOINT PROGRAM MANAGEMENT HANDBOOK

than other programs, a good relationship with contracting is important to translate objectives into contract terms and types.

Views of Former Joint Program Managers:

- *Contracting personnel must be brought in early to help with joint programs' efforts. Contracting officials must be aware of operational requirements. They cannot write contracts on "floating" requirements. Contracting personnel must be visionaries and have perspectives on creative contracting.*
- *Contracting is an area that is of great importance to the joint program manager. Contracting may provide a view on acquisition and business strategies, associations with contractors (what you can say and do), and applications to the Contracting Officers Representative (COR). A problem for the joint program manager is the lack of multiservice contracting procedures.*

Request for Proposal (RFP) Preparation

RFP preparation for joint programs is similar to single-service RFP development. However, joint military service RFPs require more careful coordination of evaluation criteria and other key factors. ACAT I programs have a statutory requirement for competitive prototyping resulting in "flyoffs" or "shootoffs" during Phase I, but competitive prototyping is waivable. Lower ACAT programs must also factor in how they will maintain competition throughout development and production. Joint program managers must also understand the significance of RFP language relating technical and cost evaluations. The more the draft RFP language emphasizes technical merit over cost, the greater the chances of the RFP driving the program to the most costly solution in a technical area. Nevertheless, identified high-risk areas may still warrant greater emphasis on technical merit over cost.

View of Former Joint Program Manager:

- *Successful programs have a common purpose from the beginning. This saves time, money and precludes "gold plating." Program requirements should be thoroughly addressed with respect to objectives and technical feasibility.*
- *Bring users and contracting personnel in early to review concept formulation.*

Systems Engineering

As with service programs, systems engineering in joint program management is an essential tool. Interrelationships, e.g., sensor to ground station, munitions to multiple military service platforms, can be analyzed by operational research techniques to develop optimum solutions. When combined with analysis of key

JOINT PROGRAM MANAGEMENT HANDBOOK

parameters and operational testing, systems analysis can help a joint program manager effectively limit risk in a very complex undertaking.

Views of Former Program Managers:

- *Integrated Product Team (IPT) (contractor and government personnel) integration was useful and necessary in keeping program together and on track. The contractor identifies high-profile, priority, and cost issues they want the joint program manager to control and monitor. Teams are identified to handle issues, i.e., security and maintenance. The contractor identifies teams and the executive board monitors overall management and timeliness.*
- *Military services have to establish requirements, priorities, and technical parameters at program implementation. Before each acquisition phase, define requirements and redefine thresholds and objectives.*

Risk Management

In many ways, program management is risk management, and joint programs add to the number of risks facing the joint program manager. By definition, the joint program manager has multiple users, requirements, and funding sources. These customers, in the broad TQM sense, can adversely affect the health of the program by requirements and funding variations and by raising political issues. A common issue is the degree and effectiveness of interoperability of the new system with participating military service systems. Accordingly, the joint program manager should be careful to monitor technical risks in order to help maintain program consensus and to ensure proper interoperability.

Risk control is an active way to manage program risk. Multiple development efforts and early prototyping are methods of minimizing risk in programs. Another way is to include a low-risk design backup in case the higher risk primary approach is not feasible. Preplanned product improvement provisions, evolutionary development, and other incremental development techniques, especially if coordinated with user commands, can split development problems into small increments and defer large risks. The use of standard software and software reuse can also minimize software and program development risks. Finally, when a parameter such as weight or range is vital to system performance, it may be appropriate to use a board that has representatives from all affected technical functions to closely monitor its progress. This may be chaired by the joint program manager. It provides management focus to the parameter by staffing all changes that affect the parameter. The board can also relate logistics and other functions to the key parameter to improve life cycle system performance.

JOINT PROGRAM MANAGEMENT HANDBOOK

Views of Former Joint Program Managers:

- *Interoperability is the number one concern among all military services. Commonality (standard maintenance and repair) is also important. Interoperability includes the joint interface/integration of documents and integration with users to determine what it is you want to interface.*
- *OSD policies, which attempt to drive a "common" platform or system, have an impact on addressing all the military services' requirements and may need to be reviewed for overall program effectiveness.*

Integrated Logistics Support

In warfare, logistics is often the most serious planning constraint. Given this military imperative, it is important to understand both lead component and participating military service logistics policies and procedures to field a sustainable system. Continuous Acquisition and Lifecycle Support (CALs) should be considered for integration into joint programs. Failure to achieve logistics agreements with military service logistics chiefs can lead to mandatory reviews and program turbulence. An Integrated Logistics Support Plan (ILSP) is prepared to document the required logistics support.

Within 90 days of awarding the Phase II contract award, the joint program manager must ensure that the lead component reports to their senior logistics authority¹ and initiate work on an inter-service logistics support agreement. This agreement is completed prior to Milestone III. If a program fails to meet this 90-day milestone, a program review will be chaired by the logistic head of the lead service. This review focuses on removing impediments to inter-service logistic support through a time-phased action plan.

View of Former Joint Program Manager:

- *Joint logistics (one depot) helps monies pass through various check points in the PPBS.*

Total Quality Management (TQM)

Effective quality management (or total quality leadership, in the Navy) comes from understanding the customer, tailoring procedures for the situation, and providing an environment in which personnel can professionally grow and develop. Successful joint program management requires the TQM principle of identifying as many of the program's customers as possible: military service PPBS personnel, acquisition leadership, contractor engineering personnel, using commands, test and evaluation personnel, etc. The total team must be energized to provide the best systems and

¹e.g., Commander, Air Force Materiel Command, or to his designated representative.

JOINT PROGRAM MANAGEMENT HANDBOOK

support for the users, often assigned to the Combatant Commands and their components. Moreover, joint program management is inherently stressful. Accordingly, the program office staff should be coached and developed to do its best.

Views of Former Joint Program Managers:

- *Joint programs should have a short but concise training program for personnel newly assigned to the program.*
- *People issues are very demanding in joint program management.*
- *Joint liaison through the life cycle of the program provides continuity and authority.*

Configuration Management

Configuration management is always challenging but can be more difficult in a joint program. Some users, with good intentions, will want to introduce government-furnished software to tackle a particular task such as aircraft scheduling or flight time recording. The sense of former joint program management debriefings was that a good handle on configuration management indicated effective program control.

View of Former Joint Program Manager:

- *When you have good configuration management, you have firm control of the program. To get a background on joint program management, review reports from DOD/IG and GAO representatives.*

Operational Test and Evaluation

The art of joint management in this area is in planning for lead component test management, sister military service participation, and fidelity to user requirements. In complex joint programs, operational tests should provide feedback to the users and to demonstrate system supportability. In other words, the effective joint program manager will use the test and not resist the test. Operational tests are also used to identify new uses and tactics for the system. Joint users must be involved in operational tests to further military knowledge and tactics in areas like Short Takeoff or Landing (STOL) employment, low-observable systems, and other new warfighting technologies. This cooperation must be described in a joint TEMP, which is coordinated with the participating military services. Separate testing provisions may be allowed for military service-unique systems or modifications. Such separate testing must be paid for by the military service with the unique requirement.

8

JOINT PROGRAM MANAGEMENT

General

This chapter reviews the previous chapters by highlighting and integrating significant management issues.

Program Office Structure

Joint program management should start with the user's vision of the military requirement, e.g., more lethal and supportable munitions or wide-area, all-weather battlefield surveillance. The program manager should then think in broad terms about the best program office structure to meet those requirements. Traditionally, these structures have ranged from a jointly staffed program office with ties to military service points-of-contact to a single military service program office receiving some funding from other military services.

Program Office Charter

Joint programs require a charter to formalize their roles and missions and to clarify joint standing with the military services. Although there is no set format for these charters, the following areas should be addressed:

- Designation of the program
- Statement of program objectives
- Joint program manager's role and accountability consistent with DOD 5000 series
- Specification for joint funding consistent with withdrawal rules discussed in Chapter 2
- Definition of military service roles
- Reporting requirements consistent with 5000 series prohibitions on dual reporting
- Program office organization and initial staffing
- Joint operating procedures

JOINT PROGRAM MANAGEMENT HANDBOOK

- Assignment of a deputy program manager, usually from the major participating military service
- Methods of resolving military service conflicts, usually referral to a higher authority
- Creation of joint committees for source selection, test, and evaluation plans, etc.
- Performance evaluations of personnel
- Provisions to review and update the charter

Management

Joint program managers must deal with changes in military service requirements, doctrine, tactics, and funding. Figure 8-1 describes the affect of this on program documentation.

Changes to the Threat

As mentioned earlier, joint program managers must be particularly sensitive to the military environment of their program. Significant changes in these areas have ripple effects in the Integrated Program Summary, especially its risk assessment, the TEMP, the RFP, the ORD, engineering specifications, and the STAR.

Operational Requirements/Performance Changes

The nature of joint programs can result in changes and "requirements creep." Range, payload, and other changes need to be documented in the Integrated Program Summary, especially the Risk Assessment, Acquisition Program Baseline, Integrated Logistics Support Plan, TEMP, engineering specifications, RFP, ORD, and STAR. Related operational performance parameter changes require the same documentation, without any STAR changes.

Operational Issues and Tactics Changes

Joint programs are also more subject to changes in user employment concepts and tactics. For example, the Air Force may publish a new Bomber Road Map that affects the program, or relatively new peacekeeping requirements in support of United Nations-controlled forces may cause program requirement changes. The COEA, TEMP, and ORD should be updated to reflect operational changes.

Software Requirements and Testing

Changes in software requirements and testing also ripple through a joint program, much as a major operational change, because of the pervasive influence of software in modern weapon systems.

JOINT PROGRAM MANAGEMENT HANDBOOK

Then Must Modify These If Any Changes In These	IPS Summary	IPS Annex A (Schedule)	IPS Annex B (COEA)	IPS Annex C (Acq Strategy Report)	IPS Annex D (Mat Assessment)	Acquisition Program Baseline (APB)	Integrated Logistics Support Plan (ILSP)	T&E Master Plan (TEMP)	Request for Proposal (RFP)	Operational Requirements Document (ORD)	Engineering Specifications	CR/CMR	STAR
Targets/Threats	X			X			X		X				X
Operational Conditions				X	X	X	X			X			X
Operational Performance Parameters				X	X	X	X		X	X			
Crew Size			X	X		X	X						
Software Requirements & Testing	X												
Test Article Requirements	X			X	X	X	X	X	X	X	X	X	
Operational Issues/Tactics		X					X		X				
Support Equipment		X		X	X	X	X		X	X	X		
Simulators		X		X	X	X	X			X	X		
Development Requirements	X	X		X	X		X	X					
Most Promising Alternative	X	X	X	X					X				
Acquisition Strategy	X	X		X	X	X			X				
Program Schedule	X	X		X	X	X	X		X	X			
Cost Estimates	X	X	X	X	X				X				
Support System				X	X	X		X	X	X			
Training					X	X		X	X	X	X		
Built in Test (BIT) Capability							X			X			
Component Requirements									X	X			

FIGURE 8-1
REQUIRED CHANGES IN PROGRAM DOCUMENTATION

JOINT PROGRAM MANAGEMENT HANDBOOK

Change and Uncertainty

As discussed in Chapter 7, systems analysis of relationships is a useful tool for joint program managers. The joint program manager should expect more changes in his or her program for the reasons discussed in this handbook and adaptively plan to integrate changes and reduce uncertainty in key program areas.

The program team, including contractors and military service budget staffs, can adapt to change, but uncertainty about key production decisions is likely to drive up costs and otherwise adversely affect the program. Therefore, program control must emphasize communications to help the program staff adjust to change constructively and not to become unfavorably altered by uncertainty. Strong leadership is needed to meet program goals in a dynamically changing geopolitical and physical environment.

Political Dynamics

As explained in Chapter 1, the definition of a joint program includes multiple users. These users and their constituencies will exert pressure on the joint program manager through requirements changes and fiscal decisions. The joint program manager needs to understand the concerns of his or her users and military service proponents, accommodate their needs in the program to the extent that they can, or explain real technical and fiscal limitations in a way that program constituents can understand. This process is complicated by cultural differences in military service doctrine, jargon, and planning. Furthermore, the joint program manager must always be aware that senior defense officials and Congress may become involved in very large or well-publicized joint programs.

Technology provided the means to win the Gulf War, but it was leadership, the painstaking creation of a quality force, and years of hard training that brought the victory about. (Col Harry G. Summers, Jr., USA, Ret, On Strategy II: A Critical Analysis of the Gulf War, 1992.)

JOINT PROGRAM MANAGEMENT HANDBOOK

ANNEX A

**MEMORANDUM OF AGREEMENT
ON MANAGEMENT OF
MULTI-SERVICE PROGRAMS**

JOINT PROGRAM MANAGEMENT HANDBOOK

MEMORANDUM OF AGREEMENT ON THE MANAGEMENT OF MULTISERVICE SYSTEMS/PROGRAMS/PROJECTS

1. Purpose:

This Memorandum establishes policies for implementing multiservice systems, program/project management in accordance with DoD Directive 5000.1, "Acquisition of Major Defense Systems," 13 July 1971. It is the basic policy document for management of multiservice systems, programs and projects, and the framework within which, like DoD Directive 5000.1, acquisition management procedures must operate.

2. Policy:

The Service designated as the Executive Agent shall have the authority to manage the program/project under the policies and procedures used by that Service. The Program/Product Manager, the Program /Project Management Office, and, in turn, the functional elements of each Participating Service will operate under the policies, procedures, data, standards, specifications, criteria and financial accounting of the Executive Service. Exception, as a general rule, will be limited to those where prior mutual agreement exists or those essential to satisfy the substantive needs of the Participating Services. This may require the Participating Services to accept certain deviations from their policies and procedures so as to accommodate the assumption of full program/project responsibility by the Executive Service. Demands for formal reporting as well as non-recurring needs for information will be kept to a minimum.

3. Responsibilities:

a. The Executive Service will:

- (1) Assign the Program/Project Manager.**
- (2) Establish an official manning document for the Program/Project Management Office which will incorporate the positions to be occupied by representatives of the Participating Services, e.g., Department of the Army Table of Distribution and Allowances (TDA)/Department of the Navy Manpower Listing/Department of the Air Force Unit Detail Listing (UDL). The manning document developed from the Joint Operating Procedure on Staffing will**

JOINT PROGRAM MANAGEMENT HANDBOOK

also designate a key position for occupancy by the Senior Representative from each of the Participating Services.

(3) Staff the Program/Project Management Office with the exception of the positions identified on the manning document for occupancy by personnel to be provided by the Participating Services. Integrate the Participating Service personnel into the Program/Project Management Office.

(4) Be responsible for the administrative support of the Program/Project Management Office.

(5) Delineate functional tasks to be accomplished by all participants.

b. The Participating Services will:

(1) Assign personnel to the Program/Project Management Office to fill identified positions on the manning document and to assist the Program/Project Manager in satisfying the requirements of all participants. Numbers, qualifications and specific duty assignments of personnel to be initially provided by each Participating Service will be reflected in the Joint Operating Procedure.

(2) The Senior Representative from each Participating Service will be reflected in the Joint Operating Procedure.

(3) The Senior Representative from each Participating Service will be assigned to a key position in the Program/Project Management Office and report directly to, or have direct access to, the Program/Project Manager. This key position could include assignment as Deputy to Program/Project Manager. He will function as his Service's representative, with responsibilities and authorities as outlined in Paragraph 3.d of this Agreement.

(4) Provide travel funds and support necessary for the accomplishment of the responsibilities of their representatives in the management of the Program/Project.

(5) Accomplish Program/Project functional tasks as specifically assigned in the Charter, in the Master Plan and Joint Operating Procedures (JOPs), or as requested and accepted during the course of the Program/Project.

c. The Program/Project Manager will:

(1) Satisfy the specific operational, support and status reporting requirements of all Participating Services.

JOINT PROGRAM MANAGEMENT HANDBOOK

(2) Be responsible for planning, controlling, coordinating, organizing and directing the validation, development, production, procurement and financial management of the Program/Project.

(3) Review, on a continuing basis, the adequacy of resources assigned.

(4) Assure that planning is accomplished by the organizations responsible for the complementary functions of logistics support, personnel training, operational testing, military construction and other facilities, activation or deployment.

(5) Refer to the appropriate authority those matters that require decisions by higher echelons. The following items will be referred to appropriate authority:

(a) Deviations from the established Executive Service policy except as specifically authorized by the Program/Project documentation (reference Paragraph 4 below).

(b) Increases in funding of the Program/Project.

(c) Changes to milestones established by higher authority.

(d) Program/Project changes degrading mission performance or altering operational characteristics.

d. Participating Service Senior Representative(s) within the Program/Project Management Office will:

(1) Speak for his parent Service in all matters subject to the limitations prescribed by his Service. Authority of the Service Senior Representative is subject to the same limitations listed above for the Program/Project Manager.

(2) Refer to his parent Service those matters which require decisions by higher echelons.

4. Documentation:

Management for particular Multiservice Program/Projects shall be documented by:

(a) A Multiservice Program/Project Manager Charter. The responsible Commander in the Service having principal Program/Project management responsibility will cause the preparation, negotiation and issuance of a jointly approved Charter which will identify the Program/Project Manager and establish his

JOINT PROGRAM MANAGEMENT HANDBOOK

management office. The Charter will define his mission responsibility, authority and major functions, and describe his relationships with other organizations which will use and/or support the Program/Project. The Charter will describe and assign responsibility for satisfying peculiar management requirements of Participating Services which are to be met in the Program/Project and will be jointly approved of the Headquarters of each involved Service by persons officially appointed to approve such Charters.

(b) A Program/Project Master Plan. This is the document developed and issued by the Program/Project Manager which shows the integrated time-phased tasks and resources required to accomplish the tasks specified in the approved statement of need/performance requirements. The plan will be jointly approved for each involved Service by persons officially appointed to approve such plans.

(c) Joint Operating Procedures (JOPs). These will identify and describe detailed procedures and interaction necessary to carry out significant aspects of the Program/Project. Subjects for JOPs may include Systems Engineering, Personnel Staffing, Reliability, Survivability, Vulnerability, Maintainability, Production, Management Controls and Reporting, (including SAR), Financial Control, Test and Evaluation, Training, Logistics Support, Procurement and Deployment. The JOPs will be developed and negotiated by the Program/Project Manager and the Senior Representative from the Participating Services. An optional format is suggested in Attachment 1 to this Agreement. This action will be initiated as soon as possible and accomplished not later than 180 days after promulgation of the Multiservice Program/Project Manager Charter. Unresolved issues will be reported to the Charter approving authorities for resolution.

(d) Coordination/Communication. Where Participating Services are affected, significant program action, contractual or otherwise, will not be taken by the Program/Project Manager without full consultation and coordination with the Participating Services while the matter is still in the planning stage. All formal communications from the Program/Project Management Office to higher authority in the Executive or Participating Services will be signed by the Program/Project Manager or his designated representative. Substantive change to the Charter, Master Plan, or JOPs will be negotiated with affected participating Services prior to issuance as an approved change. No restrictions will be placed on direct two-way communications required for the prosecution of the Program/Project work effort, other than that required for security purposes.

1 Atch

JOP Format

JOINT PROGRAM MANAGEMENT HANDBOOK

We approve this Memorandum of Agreement and its implementing regulation.

/s/HENRY A. MILEY, JR.

General, USA

Commanding General

US Army Materiel Command

/s/I.C. KIDD, JR.

Admiral, USN

Chief of Naval Material

Naval Material Command

/s/JACK J. CATTON

General, USAF

Commander

Air Force Logistics Command

/s/GEORGE S. BROWN

General, USAF

Commander

Air Force Systems Command

20 July 1973

JOINT PROGRAM MANAGEMENT HANDBOOK

Joint AMC/NMC/AFLC/AFSC Operating Procedure format.

I. INTRODUCTION:

This paragraph is intended to give a description and a brief review of the functional area of interest including why the JOP is necessary. Outline briefly the overall requirement which needs fulfillment.

II. SCOPE:

This scope will outline the various phases of the Program/Project and tie down the overall limits of the functional area of interest in terms of time and any special provisions or limitations.

III. REFERENCES:

Include all applicable AMC/NMC/AFLC/AFSC regulations, directive, etc., that are pertinent to the functional area of interest.

IV. RESPONSIBILITIES:

This paragraph is intended to identify the relationships and responsible entities such as who has the overall management responsibility and who has the support responsibility. IN addition, this paragraph should describe what the "product" or the effort should be.

V. PROCEDURES:

This paragraph should define the work to be accomplished and indicate the main steps of action, including coordination, which are required to conduct the tasks involved properly in developing the functional area of interest.

APPROVAL:

Senior Representative

Program/Project Manager

Participating Service

Executive Service

Attachment 1

FOOTNOTE:

1. This memorandum of agreement is published as a joint regulation, AFLC/AFSC R 800-2. AMCR 70-59/NAVMATINST 5000.10A.

JOINT PROGRAM MANAGEMENT HANDBOOK

INDEX

Acquisition Category (ACAT).....	1-2; 2-3
Apportionment.....	6-1; 6-3; 6-4
Chairman Joint Chiefs of Staff (CJCS).....	1-2; 1-3
Combatant Commander	1-5; 2-4
Commanders in Chief (CINCs).....	2-4; 4-2; 6-1; 6-2
Component Acquisition Executive (CAE)	2-3; 2-5; 3-1; 3-4; 4-1; 4-2; 5-2; 7-3
Comptroller.....	6-3
Computer Resources Life Cycle Management Plan (CRLCMP).....	2-8
Concept Demonstration Approval.....	1-2; 5-2
Concept Exploration and Definition.....	5-2; 5-4
Concept Exploration and Development Phase	5-2
Concept Studies Approval	5-2
Cost Analysis Requirements Description (CARD).....	2-8
Cost Analysis Improvement Group (CAIG).....	2-8; 3-3
Cost and Operational Effectiveness Analysis (COEA).....	2-6; 8-2
Defense Acquisition Board (DAB).....	2-5; 2-8; 3-2; 3-3; 3-4; 5-2; 6-4
Defense Acquisition Executive (DAE).....	1-3; 3-2
Defense Resource Board (DRB)	6-1; 6-2
Demonstration and Validation	4-2; 5-3; 5-4
Development Approval.....	5-4
Director, Program Analysis and Evaluation (Dir, PA&E)	3-3
DOD 5000.1 (Defense Acquisition)	1-5; 2-1; 3-1
DOD 5000.2 (Defense Acquisition Management Policies and Procedures).....	1-1; 1-2; 1-4; 1-5; 2-1; 2-6; 2-8; 3-1; 5-2; 5-4; 5-7; 7-3
DOD 5000.2M (Defense Acquisition Management Documentation and Reports)	1-5; 2-1; 2-6; 2-8; 3-1
DOD FAR Supplements (DFARS).....	1-4
DOD Reorganization Act of 1986 (Goldwater-Nichols)	1-5
Enactment.....	6-1; 6-2; 6-3
Engineering and Manufacturing Development	4-2; 5-4; 5-5; 5-6; 5-7
Federal Acquisition Regulations (FAR)	1-4
Integrated Priority List (IPL)	6-2
Integrated Program Summary (IPS).....	2-6; 8-2
Joint Potential Assessment Report.....	1-3
Joint Program Office (JPO)	7-1
Joint Requirement Oversight Council (JROC)	1-2; 1-3; 1-5; 2-3; 2-5; 2-8; 3-2; 4-1; 4-2; 5-1; 5-2; 7-2; 7-3
Joint Standoff Weapons System (JSOW).....	1-2; 5-4
Key Parameters.....	4-2; 7-5; 7-6
Major Modification Approval.....	5-7

JOINT PROGRAM MANAGEMENT HANDBOOK

Memorandum of Agreement (MOA)	2-1
Memorandum of Policy (MOP)	1-2; 1-5
Memorandum of Understanding (MOU)	2-1
Milestone 0	3-2; 4-1; 5-1; 5-2; 5-7
Milestone I	1-2; 2-6; 2-8; 5-3; 5-4; 7-3
Milestone II	4-2; 5-4; 7-3
Milestone III	2-4; 5-6; 7-3; 7-7
Milestone IV	5-7
Milestone Decision Authority (MDA)	1-2; 2-4; 7-3
Military Department	1-1; 1-3; 2-4
Mission Needs Statement (MNS)	1-2; 1-5; 4-1; 4-2; 5-1
Office of Management and Budget (OMB)	6-3
Office of the Secretary of Defense (OSD)	1-3; 2-4; 3-1; 3-4; 6-1
Operational Requirements Document (ORD)	4-2; 4-3; 7-3; 8-2
Operations and Support	5-6; 5-7
Phase 0	2-3; 5-2
Phase I	5-3; 5-6; 6-1; 7-4
Phase II	5-5; 6-1; 6-2; 7-6
Phase III	5-6; 5-7; 6-1; 6-3
Phase IV	5-7; 6-1; 6-4
Planning Programming, and Budgeting System (PPBS)	2-5; 6-1; 6-2; 6-3; 6-4; 7-1; 7-7
Production and Deployment	5-6; 5-7
Production Approval	5-6
Program Executive Officer (PEO)	2-3; 3-1; 3-3; 3-4
Request for Proposal (RFP)	7-1; 7-4; 8-2
Research, Development, Test and Evaluation (RDT&E)	1-4; 2-4; 5-6; 6-4
Resource Allocation Process (RAP)	6-1
System Threat Assessment Report (STAR)	2-8; 8-2
Test and Evaluation Master Plan (TEMP)	2-8; 7-3; 7-8; 8-2
Threshold	3-3; 4-2; 6-4; 7-5
Total Quality Management (TQM)	1-4; 7-1; 7-7
Total Quality Leadership (TQL)	1-4; 7-7
Undersecretary of Defense for Acquisition and Technology (USD(A&T))	1-2; 2-5; 3-1; 3-2; 3-3; 4-1; 5-2; 5-7; 7-3
Unified Commands	1-3; 1-4; 2-4; 4-1; 4-2; 6-1; 6-2
Unmanned Aerial Vehicle (UAV)	2-6
U.S. Atlantic Command (USACOM)	1-4; 4-1
U.S. Southern Command (USSOUTHCOM)	1-4; 6-1
U.S. Special Operations Command (USSOCOM)	1-4; 4-2
Vice Chairman Joint Chiefs of Staff (VCJCS)	2-5; 3-2
Worldwide Military Command and Control System (WWMCCS)	1-2

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